Site 276 Kent's Island Creek

Overview: The Kent's Island Creek potential restoration site is located along an unnamed access road approximately 550 ft south of Hay Street in Newbury. The site encompasses approximately 47 acres of primarily salt marsh upstream of an existing access road to Kent's Island. The upland island, along with nearly all of the surrounding salt marsh, were part of a former estate which was acquired by the State and is managed by the Division of Fisheries and Wildlife as the Kent's Island Wildlife Management Area. The access road is shown on the 1894 USGS Newburyport-Exeter, NH-MA Quadrangle map. The creek (referred to in this report as Kent's Island Creek) is an unnamed tributary to the Little River which joins the Parker River approximately 0.25 miles west of the Route 1A bridge crossing. The creek also passes under the MBTA rail line approximately 0.25 miles downstream of the access road crossing. The potential restoration site is also contiguous with the extensive salt marsh extending north from the Parker River, west of Kent's Island. The Kent's Island access road is relatively low-lying and is routinely overtopped during storm events. Despite these additional conveyances, the Kent's Island Road crossing restricts tidal exchange during most tides. Tide gauge data collected in early May of 2005 documented a maximum restriction of approximately 0.5 ft. Other evidence of a tidal restriction includes: distinct scour pools both up and downstream of the road crossing, bank erosion, impounded conditions upstream of the crossing, and limited populations of invasive species including *Phragmites* and loosestrife. There is also a pronounced decrease in the typical dimensions of the creek upstream of the access road. The approximate width of the channel is 22 and 32 ft upstream and downstream, respectively.

As mentioned above, nearly all of the restoration area is publicly owned and managed as part of the Kent's Island Wildlife Management Area including the access road.

Structure conditions: The Kent's Island access road is in poor condition with substantial pavement degradation especially along the western shoulder due to scour when the road is overtopped during storm events. The low points in the roadway are only approximately 0.5 ft higher than the elevation of the adjacent high marsh. Most of the roadway is approximately 1.0 ft higher than the elevation of the adjacent high marsh. The access road is typically 12 feet wide with gravel shoulders. The bridge crossing consists of concrete deck with steel/Timber beams on stone abutments. The span is approximately 32 ft long with a width of 13 ft. The bridge deck and abutments are severely deteriorated from scour and lack of routine maintenance. Eroded stone from past structures at the crossing have reduced both the width and depth of the effective flow path. Stone in the base of the creek under the bridge deck is approximately 2.8 feet above the downstream creek elevation which causes substantial impoundment within the creek during ebb conditions.

In addition to providing access to the Management Area for staff, visitors and haying operations, the bridge provides the only access to Kent's Island for emergency and fire response vehicles. The existing condition of the structure severely limits the Town's ability to response to these situations (T. Leonard, DPW Director, pers. comm.)

Ecological Integrity: The potential restoration site generally has a high level of ecological integrity. Nearly all of the marsh and supporting land is part of a management area. The area is open for hunting, fishing and trapping, although little management is practiced (P. Huckery, MDFW, pers. comm.). Fisheries and Wildlife does allow haying, evidence of which was observed throughout most of the marsh. The marsh also has a relatively high density of long, narrow lateral ditches which allow for more efficient haying operations. The northwestern extent of the potential restoration site contains a few large pannes which are the result of unmaintained ditches.

However, the majority of the ditching on the marsh has been well maintained and as a result the potential restoration site supports a high portion of *S. patens*-dominated high marsh and contains a limited number and size of existing salt pannes. *Iva* is more commonly observed along the ditches upstream of the crossing.

The eroding condition of the existing road bed is causing minor siltation of road bed materials onto the marsh. No major sources of nonpoint source pollution were observed. The potential restoration site is contained within the Parker River/Essex Bay ACEC and BioMap Core Habitat. Most of the surrounding forest lands are mapped as Supporting Natural Landscape. The area lies just beyond a zone of mapped Priority Habitat along the Parker River. Land uses are undeveloped forest lands, agricultural fields, and low density residential development. The upper reaches of the wetland system include a freshwater marsh/wet meadow, shrub swamp and forested wetland. Stands of *Phragmites* and loosestrife within the potential restoration site are limited to small fringing populations, which were also observed (to a lesser extent) downstream of the crossing.

The elevated creek bed at the crossing restricts fish passage over the lower portion of the flood tide. The creek, along with Little River downstream of the potential restoration site is mapped as suitable habitat for European and American oyster and soft-shelled clams. The Parker River includes substantial soft- shelled clam beds.

Two tide gauges were deployed from May 3 to May 17, 2005 upstream and downstream of a bridge across Kent's Island Creek. Results of the gauge deployment show a small restriction of tidal flow through the bridge which increases slightly as tidal prism increases. These restrictions occurred during all of the 27 tidal cycles recorded for this deployment. Tidal restrictions range from 0.15-0.42 ft and delays ranged from less than 10 to 33 minutes. The highest recorded tide downstream of the bridge occurred on May 8 at 1:40 AM at an adjusted height of 6.32 ft. Upstream high tide occurred at 2:03 AM at an adjusted height of 6.13 ft. The resulting tidal dampening was 0.19 ft and a delay of 23 minutes. The dampening amounted to approximately 3.9% of the total tidal prism recorded at the downstream gauge. The period of the highest recorded tide coincided with a significant storm event and precipitation in excess of one inch which likely impounded additional freshwater on the marsh and influenced the peak elevation recorded upstream of the culvert. Greater restrictions to the tidal prism occurred immediately before and following the May 8th tide, with the greatest restriction measuring 0.42 ft on May 7 during the afternoon/evening tide. This restriction amounted to approximately 7.1% of the total tidal prism recorded at the downstream gauge. The longest delay recorded was 33 min on May 9 during the morning tide.

Relatively low salinities of 2.8 and 3.0 ppt (downstream and upstream, respectively) were recorded on a near slack, ebbing tide. These values are indicative of significant freshwater contributions to marsh system, especially during spring conditions.

The overall severity of the existing impairments is considered moderate. A reduction in the tidal restriction with the replacement of the dilapidated bridge crossing with a new span and headwalls (constructed slightly south of the existing span to better align the channel), along with the removal of the stone within the creek, would reduce the observed bank erosion and impounded channel conditions. Over time, increased tidal exchange would limit the expansion of the small fringing populations of *Phragmites* along with other brackish marsh vegetation, and would allow the marsh plain to increase in elevation in response to rises in sea level. The conversion of other wetland communities including freshwater marsh/wet meadow and shrub swamp to salt marsh or brackish marsh are likely to be minor. Relatively small areas of forested wetland in the

northwestern corner of the potential restoration site are likely to remain unaffected. No impacts to abutting developed lands are anticipated.

Socioeconomic: Recreational values of the potential restoration site are enhanced by the excellent public access and wildlife viewing opportunities provided by the access road. The protected land status of the site and good access enhance educational opportunities. However, there is no known ongoing research or nearby schools. The potential restoration site's Uniqueness/Heritage value is enhanced by its inclusion within the Parker River/Essex Bay ACEC. The site does not include any known cultural resource elements or urban setting values.

Construction Logistics/Feasibility: The restoration potential for this site is enhanced by several factors including: tidal restriction caused by existing stone within the channel and degraded headwall condition, lack of traffic, suitable construction access and staging areas (road closure and available lay down areas near Hay Street), no low lying abutters, and the lack of above or below ground utilities. Given the fact that the bridge is currently not accessible to emergency response vehicles due to its deteriorated structural condition, it is anticipated that the access road could be closed during construction. There are no major factors present which would escalate costs over a typical bridge replacement project. The replacement structure would be designed for H-20 loading.

Due to the poor condition of the existing abutments, it is recommended that the existing bridge deck and abutments be removed and replaced. Depending on the existing subsoil the new structure could either be a precast concrete box culvert or a precast concrete deck on cast-in-place concrete abutments. Hydraulic modeling will be necessary to determine the appropriate span length. However, replacement with a similar span length coupled with the removal of all the existing stone obstructing tidal flow between the abutments will likely be sufficient. In addition to replacing the existing bridge, it is also recommended that hardened swales be constructed along the access road to allow tidal sheet flow to cross the road during high tides. These hardened swales would help stabilized the access road and would also increase tidal exchange during spring tides. Total construction costs are estimated to be $350,000. The restoration opportunity has a high level of local support within the Town and the Parker River Clean Water Association.

Restoration Potential: The site is considered to have medium restoration potential based on the presence of several important socioeconomic factors including the high recreational value, State-owned and managed land status, and high level of ecological integrity (included within the Parker River/Essex Bay ACEC). Although the extent of the tidal restriction is not as severe as some other sites included in the study, there is substantial impoundment occurring within the creek and the existing creek bank scour will continue to worsen and further compromise the structural integrity of the crossing. In addition, the road condition will also continue to deteriorate and cause siltation within the wetland. Other important contributing factors to the medium restoration potential designation include the lack of construction implementation drawbacks (e.g., lack of low-lying structures, abutting private property requiring access, or utilities). The roadway and bridge provide the only access to Kent's Island for emergency and fire response vehicles which is severely limited under current conditions. The size of the structure and associated work on the access road will influence construction costs. The next key step toward implementation involves coordination with the MA Fisheries and Wildlife to discuss overall maintenance needs for the Management Area, funding priorities and cost sharing opportunities.

Site # 276 | Site Features | Scale: 1:2,500

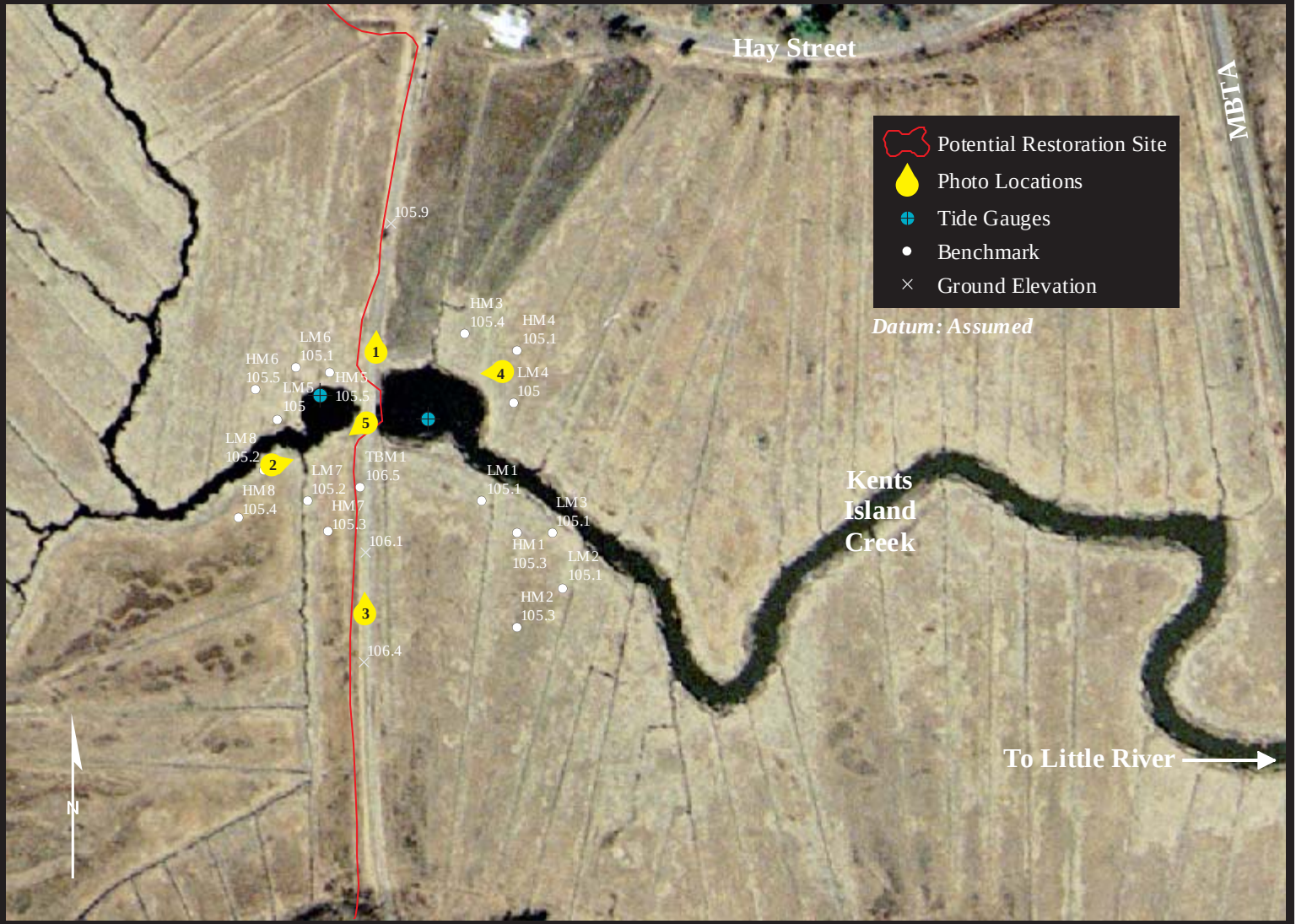


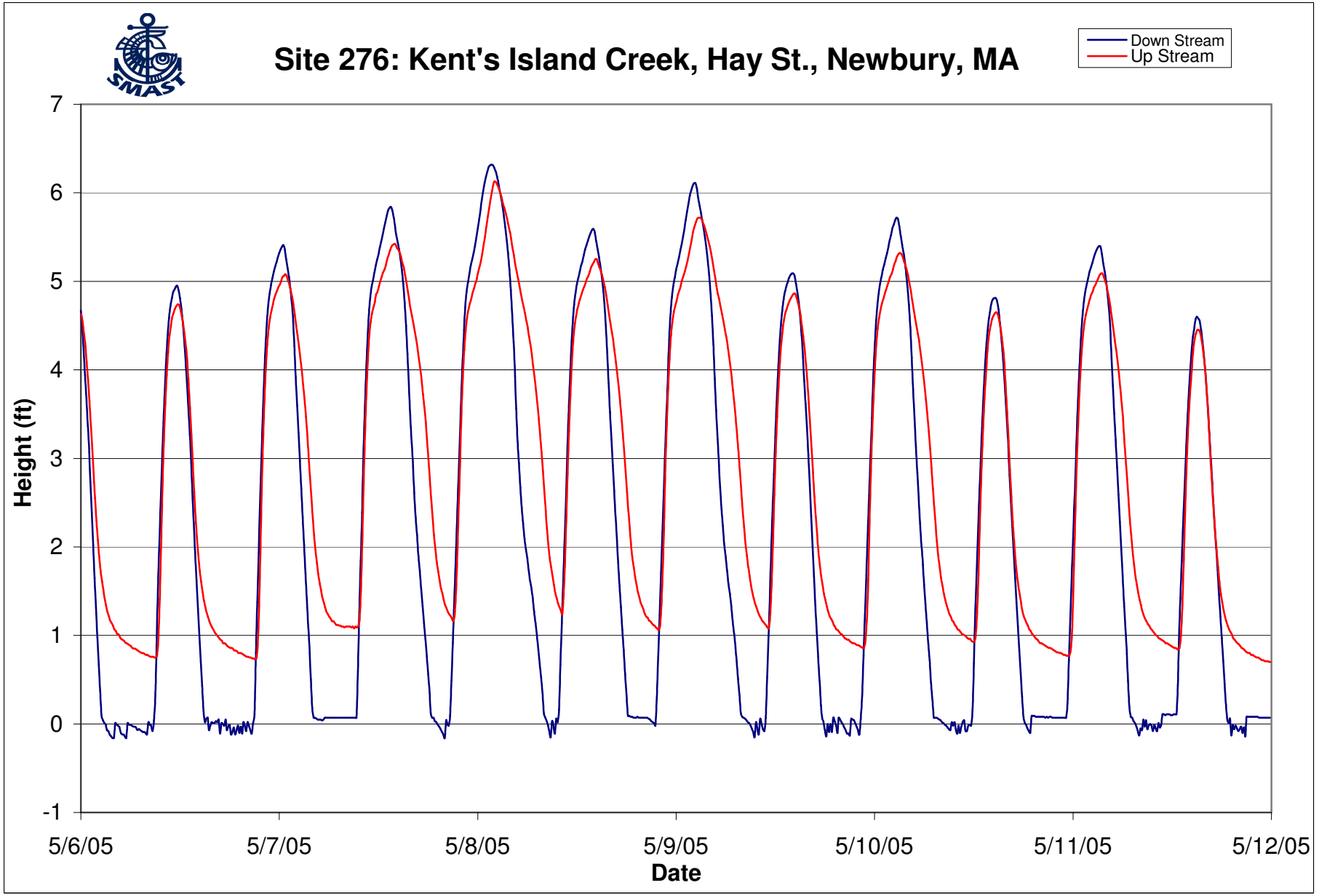
Photo 1 - Access Road North of Bridge Crossing Viewing North

Photo 2 - View of Upstream Side of Bridge Crossing

Photo 3 - Access Road South of Bridge Crossing

Photo 4 - View of Downstream Side of Bridge Crossing

Photo 5 - Salt Marsh Upstream of Bridge Crossing


Site 276: Kent's Island Creek, Hay St., Newbury, MA
Down Stream
Up Stream
Height (ft)
7
6
5
4
3
2
1
0
-1
5/6/05
5/7/05
5/8/05
5/9/05
5/10/05
5/11/05
5/12/05
Date

Great Marsh Coastal Wetlands Restoration Planning
Rapid Field Assessment

Site # 276
Kent's Island Creek

Site Information

Site ID:	276
Site Name:	Kent's Island Creek
Municipality	Newbury
Location:	Bridge crossing along unnamed access road, 550 ft south of Hay Street intersection
Adjacent Waterbody:	Little River

Affected Area (Acres)

Mudflat/Open Water:	0	Total Area:	47.3
Salt Marsh:	47.3		
Other Wetland:	0	*Other Description:*	
Other:	0		

Impairment(s)

Tidal Restriction	☑	Fill	☐
Obstructed Ditche(s)	☑	Invasive Species	☑
Impoundment	☑	Pollution / Siltation	☐

Severity of Impairments: Moderate

Project Type

Roadway Culvert(s)	☐	Obstructed Ditches	☑
Bridge	☑	Fill	☐
Berm	☐	Other	

Evidence of Restriction

Gauge Data	☑	Impounded Flow	☑
Downstream Scour Pool	☑	Obstructed Flow	☑
Upstream Scour Pool	☑	Invasive Species	☑
Bank Erosion	☑	Ponded Conditions	☐
Slumping	☐	Subsidence	☐

Structure / Channel:

Overall Condition:	Poor
Life Expectancy (Years):	5
Road Condition:	Poor
Structure Type:	CIP/steel/timber bridge
Structure Age (Years)	50
Structure 1 Width (Feet):	13
Structure 1 Length (Feet):	32
Structure 2 Width (Feet):	
Structure 2 Length (Feet):	
Skew (Degrees):	0
Cover (Feet):	0
Scour Protectection:	☑
Adequately Aligned:	☐
Headwall Type:	None
Headwalll Condition:	None

Ecological Integrity / Habitat Value

Surrounding Land Use %

Commercial / Industrial	0
Residential	5
Agricultural	15
Undeveloped	75

Severity of Impairment(s)	Moderate
Invasive Plant Cover:	Low
Extent of Wooded Buffer:	Good
Habitat Connectivity:	Good
NHESP Estimated Habitats of Rare Wildlife:	☐
NHESP Priority Habitats of Rare Species:	☐
NHESP BioMap Core Habitat:	☑
NHESP BioMap Supporting Natural Landscape:	☑
ACEC:	☑
Anadromous Fish:	☐
Shellfishing Suitability:	☑
Barriers to Fish Passage	Minimal

Great Marsh Coastal Wetlands Restoration Planning
Rapid Field Assessment

Site # 276
Kent's Island Creek

Construction Logistics / Feasibility

Traffic Volume	Low
Detour Potential	☐
Site Access	Good
Staging Areas	☑
Fill Material Concern	Minimal
Low Lying Property Concerns	Minimal
Overhead Utility Constraint	None

Underground Utilities

Water	☐	*Telephone*	☐
Gas	☐	*Sewer*	☐
Electric	☐	*Drainage*	☐

Permitting Complexity	Low
Local Support	Unknown
Feasibility Cost	20,000
Design Cost	40,000
Permitting Cost	25,000
Construction Cost	350,000
Total Cost	430,000
Relative Cost/Acre	9,000

Socioeconomic

Recreation

Public Access:	☑
Watercraft / Portage:	☐
Wildlife Viewing:	☑

Education

Schools Nearby:	☐
Ongoing Research:	☐
Education / Outreach Potential:	High
Saftey Concerns (Access):	Low

Uniqueness / Heritage Value

Rare Species Habitat:	☐
ACEC:	☑
Cultural Resource Features	☐
Urban Viewscape Value:	None
Urban Habitat Value:	None

Tide Surveys

	Start:		*Finish:*
Dates of 1st Survey:	5/3/2005	-	5/17/2005
Date of Highest Tide:	5/7/2005		
Max Measured Tidal Dampening:	0.42		
Percent of Tidal Prism:	7		
Measured Delay:	33 min		

	Start:		*Finish:*
Dates of 2nd Survey:		-	
Date of Highest Tide:			
Max Measured Tidal Dampening:			
Percent of Tidal Prism:			
Measured Delay:			

Summary

Uniqueness / Heritage Value:	Medium	Ecological Integrity:	High
Recreational Value:	High	Logistics / Feasibility:	High
Educational Value:	Medium		

Restoration Potential: Moderate